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THE PERMANENCE OF WATER-COLORS.

FROM new experiments on the influence of light on water-colors, Professor A. H. Church, in *The Magazine of Art*, deduces certain rules which should be of considerable value in practice. The paper used, he says, should contain nothing but pure linen fibre and a small proportion of size. There must be no bleaching agent, whether acid or alkali, left in it. To test paper for these impurities, a sample should be boiled in a little distilled water, and the water drained off into a glass vessel and a little tincture of violets added to it. If acid is present in the water, the violet tincture will be changed to red; if an alkali is present, it will become blue; any bleaching agent will deprive it of color. Without mentioning names, Professor Church states that "the papers of the best makers" stand this test. But he has occasionally found, even in these papers, particles of metallic iron which are liable to rust and produce spots of iron-mould. All papers, too, contain a considerable proportion, between seven and ten per cent in weight, of water, and this moisture has an important influence upon the stability of a water-color drawing. In the case of a framed drawing, this moisture passes at times from the paper to the glass, where it is condensed; and when the glass becomes warmer it is vaporized and is reabsorbed by the paper. As it must both times pass through the pigments, its tendency to promote changes in them may readily be imagined. Yet, as water-colors are usually framed, thin moisture is not only prevented from escaping, but is actually added to by that contained in the paste with which the brown paper backing is held to the frame. Bookbinders' solution of india-rubber is recommended instead of paste. Paper that is light for its thickness should be preferred; and colors which contain little glycerine or honey, both of which absorb and give out water.

The action of all the deleterious gases to be found in the air of city apartments, with the exception of sulphurated hydrogen, is increased by light. To exclude these from contact with the drawing, a thick coating of white lead over the paper backing will be found advisable.

With regard to artificial lights, candles and oil are held to be the least dangerous to properly framed water-colors. Gas produces injurious substances; but if these are excluded by using the precautions above pointed out, the light itself is not likely to have any marked bad effect. Incandescent electric lamps are said to be "probably unobjectionable;" but the more powerful arc lights are classed as highly objectionable, as the light given off by them is exceptionally rich in actinic rays and is very active in producing chemical changes.

The direct rays of the sun are, also, chemically powerful, much more so than diffused daylight. The protection afforded to pictures by the exclusion of direct sunlight is beyond question more important than the reduction of luminosity thus caused. A slight wash of carmine, which is completely bleached in six hours by the direct rays of the sun, will show but little change after six weeks' exposure to diffused light. Indigo is much less alterable by light than carmine, and it required thirty days of sunshine and many months of diffused light to affect a pale wash of it. Professor Church compares this with the effects on the human skin of a cupful of boiling water and a paifull of warm water, and argues that in washes of moderate depth many colors are admissible (if the work in which they are used is preserved from direct sunlight) which would otherwise have to be discarded as fugitive.

Some of these comparatively fugitive pigments may also be rendered proof even against strong sunlight by admixture with permanent pigments or by a glazing of the latter. Thus Prussian blue alone is readily affected

by sunshine; but, mixed with cobalt, it has stood seven years' exposure thereto, without appreciable change. Aureolin has the opposite effect upon indigo. Absolutely pure indigo must be classed as permanent. It owes its bad name to the impurities generally contained in the unrefined article.

The pigments which Professor Church would condemn are: carmine, crimson lake and all cochineal pigments; yellow lake, brown, pink, sepia and the bituminous variety of Van Dyck brown. Artificial vermilion blackens slowly. Emerald green (aceto-arsenite of copper) is dangerous when used with cadmium yellows, and is particularly sensitive to sulphurated hydrogen. Flake white, sap green, gamboge, violet carmine, and the chromes should also be discarded.

Pigments which may be considered as permanent when the drawings in which they are used are treated with care are Indian yellow, the madders, indigo and Prussian blue. Brown madder is the least stable of these. Prac-

ground will use up all the sketcher's time, and his patience and interest in the subject as well; the effect which attracted him will vanish, meanwhile, and he will gain by an afternoon's work only a poor and unreliable foreground study, when he might have made a thorough one in half the time.

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In order to be of use in painting comprehensive landscape views, one should make a mental classification of the varieties of "foreground stuff" that he oftenest meets with, and, after making close studies, should attempt rapid but correct sketching of each variety. It may be sufficient for the purposes of the landscapist to divide all such vegetation (distinct from bushes and trees) into the four classes of grasses, vines, large-leaved plants, like the dock and most cultivated roots, and plants of upright habit, like thistles, golden-rod and hawkweed. But it will be better to go a little further and learn enough botany to distinguish, by their general characteristics, not by their flowers, the following botanical classes: Ranunculaceæ, or Buttercup family; Compositæ, or Aster and Thistle family; Liliaceæ, or Lily family; Cruciferæ, or Kale family, and, perhaps, a few more. It is of little use studying the botany of forest trees, because their relations as given by the botanists are often either very obscure, or else obvious to everybody. No one will confound an oak with a pine, or fail to see the similarity of the fir to the hemlock. The landscapist may content himself with making studies, under different aspects, of the species and varieties that he recognizes as most common or most picturesque.

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MOST of these studies may best be begun in winter when the branches, being bare of leaves, may be traced from trunk to spray. The ramification of coniferous trees, which do not lose all their leaves, is so regular and striking that it can be perceived at any season. Pines are particularly worthy of study. Of the others, the oak is very irregular, and has clumsy, knotted branches; the beech shows a strong tendency to spread horizontally in its lower portion, while the main branches grow upward at an angle from the stem more acute as they are farther from the ground, and curve like a whip-lash. The birch and several other trees have nearly upright branches and drooping twigs, while the poplar and aspen show an upright tendency in both branches and twigs. In summer, the disposition of the masses of foliage follows that of the branches, but with differences occasioned by sparseness or luxuriance of growth as much as by the form and size of the leaf. It results from this that individuals of the same species and variety will look very different

from one another, and the same individual, even, will present different forms at different seasons.

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AN oak growing in the open shows, with us, a trunk of medium height, neither so heavy nor so quickly branching as the English oak, still, very similar, with powerful roots, wandering branches and masses of leafage, which offer most varied silhouettes. Most of our oaks, however, have grown up surrounded by other trees though they may now stand alone. The trunk rises often to a great height without a single large branch. The branches first put forth, as rule, soon decay, and are broken off, leaving the trunk rough with nodosities. The upper branches, where they get room to spread do so in the most fantastic way; yet there is a degree of regularity in their diminution as they proceed, one out of the other, and in the balance which is maintained among them, modified very sensibly by the strength of the main boughs and by the firmness of the attachment of the lesser branches to it. Circumstances occasionally conspire to favor the growth of large branches on one side,



"PEASANT OF THE BLACK FOREST." BY LUDWIG KNAUS.

FACSIMILE OF A CRAYON DRAWING BY THE ARTIST.

tically permanent are zinc white, aureolin, yellow ochre, raw Sienna, cadmium yellow, light red, Indian red, viridian, ultramarine, cobalt, burnt Sienna, raw umber, Verona brown, India ink and ivory black.

HERBAGE of all sorts, except in the foreground, it is generally safe to paint exactly as bare earth would be painted, that is, by values, with strict attention to relief, perspective, and the changes of local color. One will find that the character of many kinds of vegetation may be given in this way without any drawing, or even indication, of individual plants. But in foregrounds it is seldom possible to simplify things so much. There, not only should care be taken to indicate by some sort of handling the general character of the vegetation, whether poor or luxuriant, uniform or varied, but this will be found insufficient without considerable drawing of individual plants. If one has not made a good many careful preliminary studies, the more interesting a foreground may be the more should he refuse to have anything to do with it. For the effort that will be required to draw in sufficient detail to make a satisfactory fore-